

MODIS Semi-Annual Report

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The primary focus of this research activity is to provide the development and testing of the MODIS fire algorithms and processing code, the design, development and testing of the product quality assurance procedures and the design of the product validation. Resources from this contract were also allocated to support development and testing of the land surface reflectance product through an active collaboration with Eric Vermote (UMd). In addition this contract supported Dr. C. Justice to fulfill the tasks of Land Discipline Leader and the associated coordination activities.

Over the last six months emphasis has been given to prototyping the MODIS data products using AVHRR 1km data, ensuring that the MODIS processing code was delivered to SDST for software integration and test; transitioning from ECS processing of Level 2/3 data products to the P.I. processing in MODAPS; examining early products of the first SDST Week in the Life Test, developing and testing Quality Assurance tools within the SCF and the LDOPE, developing validation activities in the context of the SAFARI experiment and contributing to and coordinating the Land Validation Plan.

Task 1. Refining Fire Processing Code (L.Giglio/Paul Fisher)

L. Giglio (SSAI) worked with Paul Fisher (SSAI) to debug the MODIS surface reflectance and fire product code. Giglio is responsible for the Level 2 Code and Fisher for the Level 3 Code. The MODIS Level 2 fire product code was revised to generate seven additional QA metadata fields. These fields will allow a preliminary inspection of the fire product using just the

product metadata, rather than the actual data. This will also simplify the development of software tools intended to automatically large quantities of MODIS data archived after launch. The MODIS Level 2 fire product file specification was revised to include these additional QA metadata fields.

Three fire product specific quality assurance (QA) software tools were developed. The first tool, a Level 2 metadata inspection program, was implemented to run automatically on the metadata of every granule produced. The program notifies a list of recipients via e-mail of granules that fail any of the QA tests that are built into the program.

The sun-glint test used in the MODIS fire product code was changed following the specifications of Y. Kaufman (GSFC Code 913). The revised test more liberally labels pixels as being affected by sun-glint. L. Giglio worked with Andrew Wald (Code 913) to develop MODIS fire product validation and fire-pixel consolidation issues.

The JGR Paper for the MODIS Fire Product and preparatory science was completed and submitted, describing the MODIS fire algorithm and products.

During this reporting period L. Giglio and P. Fisher attended 17 MOD09/14 SCF (Science Computing Facility) meetings concerning code status, testing plans, and development of quality assurance (QA) tools for the MODIS surface reflectance and fire products.

The MODIS fire product QA (quality assurance) test plan was generated. The MODIS fire product ATBD (algorithm theoretical basis document) was updated to include algorithm and product changes made over the past two years. The revised ATBD was submitted to Doug Bennet (GSFC Code 900) for inclusion in the on-line ATBD archive.

The shell for the MODIS L3 Climate Modeling Grid fire code was developed by Paul Fisher.

Justice, Fisher and Giglio attended the MODLAND SDST meeting 9-10 September. L. Giglio prepared and presented talk outlining the MODIS fire product quality assurance (QA) plan and software QA tools that are currently under development.

Task 2. AVHRR MODIS Prototyping

Giglio completed investigation of temporal autocorrelation in VI3 burn scar index as a possible way of reducing false scar detections caused by geolocation error in our prototype AVHRR burn scar algorithm. Determined that the autocorrelation was useful for eliminating false scar detections under certain conditions. The installation of custom software and libraries on the MODIS fire SCF HP workstation was completed.

Bob Swap (UVA) assisted Eric Vermote (UMd) in the development of the aerosol component for the AVHRR prototype of the land surface reflectance product.

Task 3 Fire Product Validation

Giglio traveled to South Africa and Zambia with D. Roy (UMD) and J. Privette (GSFC) for MODIS/AVHRR active fire and burn scar product validation planning and field work. The planning is being undertaken in the context of EOS SAVE project and the SAFARI 2000 regional science initiative. While in Zambia the group was assisted by P. Frost of the University of Zimbabwe. R. Scholes from CSIR was involved in the planning of the MODIS burned area and active fire product validation. Giglio compiled ancillary data bases for post-launch MODIS fire QA from the IGBP data base and the NOAA global gas flares data base .

Giglio's AVHRR fire simulation model was adjusted for the MODIS instrument characteristics. This model will be used to provide a fire product accuracy statement for the MODIS fire algorithm, and allow testing of other improved candidate algorithms.

Korontzi developed a data base of burn scar data from sample Landsat Thematic Mapper for evaluation of the MODIS prototype burn scar algorithm. The data base was derived from Landsat imagery and entered into Arc Info. Statistics of average fire size were developed for a number of locations and ecosystems in the Southern Africa region.

Task 4. SAFARI 2000 Planning

Bob Swap (UVA) is the US coordinator for the Southern African Regional Science Initiative - SAFARI 2000. SAFARI 2000 is the biggest single

validation activity planned for the AM Platform. Swap has been responsible for integrating the MODIS fire validation activities into the early science planning for SAFARI 2000. Close collaboration is being developed with the Southern African Validation of EOS (SAVE) project. Swap is also attempting to engage other land validation activities from the EOS AM platform instruments e.g. MOPITT, ASTER, MISR and CERES. Swap assisted in the development of the SAFARI 2000 web page - <http://safari.gecp.virginia.edu>

The calendar of Swaps SAFARI activities in 1998 were as follows:

- July 11-18, 1998 - SAFARI 2000 Workshop, Blydepoort, South Africa, jointly sponsored by US National Science Foundation and RSA Foundation for Research Development
- July 23, 1998 - SAFARI 2000 Briefing meeting to RSA agencies, the US Embassy and Science Attache and the Commonwealth Science Council (UK)
- Early August - Formulation of a letter to the South African side of the US/RSA Bi-national commission about the launch of SAFARI 2000
- August 8 (or so) - SAFARI 2000 Briefing meeting for MOPITT (Measurements Of Pollution In The Troposphere) folks at NCAR (US National Center for Atmospheric Research)
- August 19-25, 1998 - SAFARI 2000 Briefing meeting for IGAC (International Global Atmospheric Chemistry) BIBEX (biomass burning experiment group)
- September - Publication of IGBP Global Change Newsletter (no. 35) on SAC V (Fifth Scientific Advisory Council) with an overview article on SAFARI 2000
- September 8, 1998 - SAFARI 2000 Briefing meeting to NASA, NSF and IGBP-START (Systems for Analysis, Research and Training) at NASA HQ, Wash. DC.
- End of September - production of the first executive summary about SAFARI 2000
- Middle of October - SAFARI 2000 Presentation to International START Steering Committee in Washington DC.
- Middle of October - SAFARI 2000 Presentation to State University of New York at Albany
- End of October - Submission of SAFARI 2000 Overview Article to IGAC Newsletter "IGACtivities"
- End of October - Circulation of a preliminary Investigator Matrix for those individuals planning to participate in SAFARI 2000 that would like

to be covered under a large blanket MOU between NASA and appropriate parties.

- Middle of November - Meeting at Univ. of Virginia of SAVE-EOS scientists
- Middle of November - Work underway on SAFARI 2000 Overview Article that focuses on NASA EOS AM1 Validation Activities for Earth Observer
- December 16, 1998 - SAFARI 2000 Overview and related measurements of interest to MOPITT Correlative Team Meeting - University of Toronto, Toronto, CA
- December 15-18, Representation of SAFARI 2000 at
- End of December - Completion of SAFARI 2000 Science Plan Rough Draft

Task 5. Miscellaneous Discipline Leader Tasks

Chris Justice participated in the P.I. Processing design and planning meetings.

Chris Justice chaired the MODLAND/SDST meetings.

Chris Justice participated in the MODIS Land Cover meeting at Boston University.

Chris Justice attended the Discipline Leaders meetings.

Publications

Justice C.O. et al. The Moderate Resolution Imaging Spectroradiometer (MODIS): land remote sensing for global change – IEEE Trans. Geoscience and Remote Sensing, Vol 36, No 4. 1228-1249, July 1998

Kaufman Y.J., Justice. C.O. et al. Potential global fire monitoring from EOS-MODIS , Journal of Geophysical Research, Accepted August 1998 - in press.

Cohen W. and Justice C.O., MODIS Land Product Validation. Remote Sensing of the Environment, Accepted November 1998 in press.

Roy, D.P., Giglio, L., Kendall, J.K., Justice, C.O., Multitemporal Active-Fire Based Burn Scar Detection Algorithm, International Journal of Remote Sensing, Accepted September 1998 - in press.

Giglio, L., Kendall, J. D., and Justice, C. O., 1998, Evaluation of Global Fire Detection Algorithms Using Simulated AVHRR Infrared Data, International Journal of Remote Sensing, Accepted October 1998 - in press.

SAFARI 2000 – a Southern African Regional Science Initiative, Chris Justice, Bob Swap, Harold Annegarn, and Mary Scholes, IGBP Global Change Newsletter, No. 35, September 1998

SAFARI 2000 – a Southern African Regional Science Initiative, Bob Swap, Harold Annegarn, Mary Scholes, and Chris Justice, IGACTivities Newsletter of the International Global Atmospheric Chemistry Project, No. 15, December 1998.

SAFARI 2000 – a Southern African Regional Science Initiative, Bob Swap, Jeff Privette, Michael King, David Starr, Tim Suttles, Harold Annegarn, Mary Scholes, Chris Justice, NASA Earth Observer Newsletter, 10.

Justice, C.O., D. Starr, D. Wickland, J. Privette, T. Suttles. EOS Land Validation Coordination: an update. Earth Observer 10, 55-60.

Justice, C.O., R. Swap, H. Annegarn, M. Scholes. SAFARI-2000. IGBP Newsletter 35, IGBP Stockholm.

Justice C.O. et al. Satellite Fire monitoring: a status report. IGACTivities, IGBP, #15, Dec 1998